MALHEUR NATIONAL WILDLIFE REFUGE

Burns, Oregon

ANNUAL NARRATIVE REPORT

Calendar Year 1979

NATIONAL WILDLIFE REFUGE SYSTEM

Fish and Wildlife Service

U.S. DEPARTMENT OF THE INTERIOR

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Malheur NWR Staff Photo: Ditto

PERSONNEL

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William R. Aulbach, WG-9, PFT	Maintenance Mechanic
Norman J. Warneke, WL-9, PFT.	Work Leader
Ruth Warneke, GS-5, PFT	Secretary
Charles L. Yriarte, WG-9, PFT	Maintenance Mechanic
Bradley D. Ehlers, GS-9, PFT.	Assistant Refuge Manager

Back Row (Left - Right)

Joseph P. Mazzoni, GS-13, PFT	Refuge Manager
Marvin L. Jess, WG-10, PFT	Dragline Operator
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Clyde R. Miller, WG-9, CS	Maintenance Mechanic

Not Pictured

Ernest A. Alfstad, GS-7, PFT	Administrative Officer

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Sally Fine, WG-7	EOD:	10-03-79	Maintenance Worker
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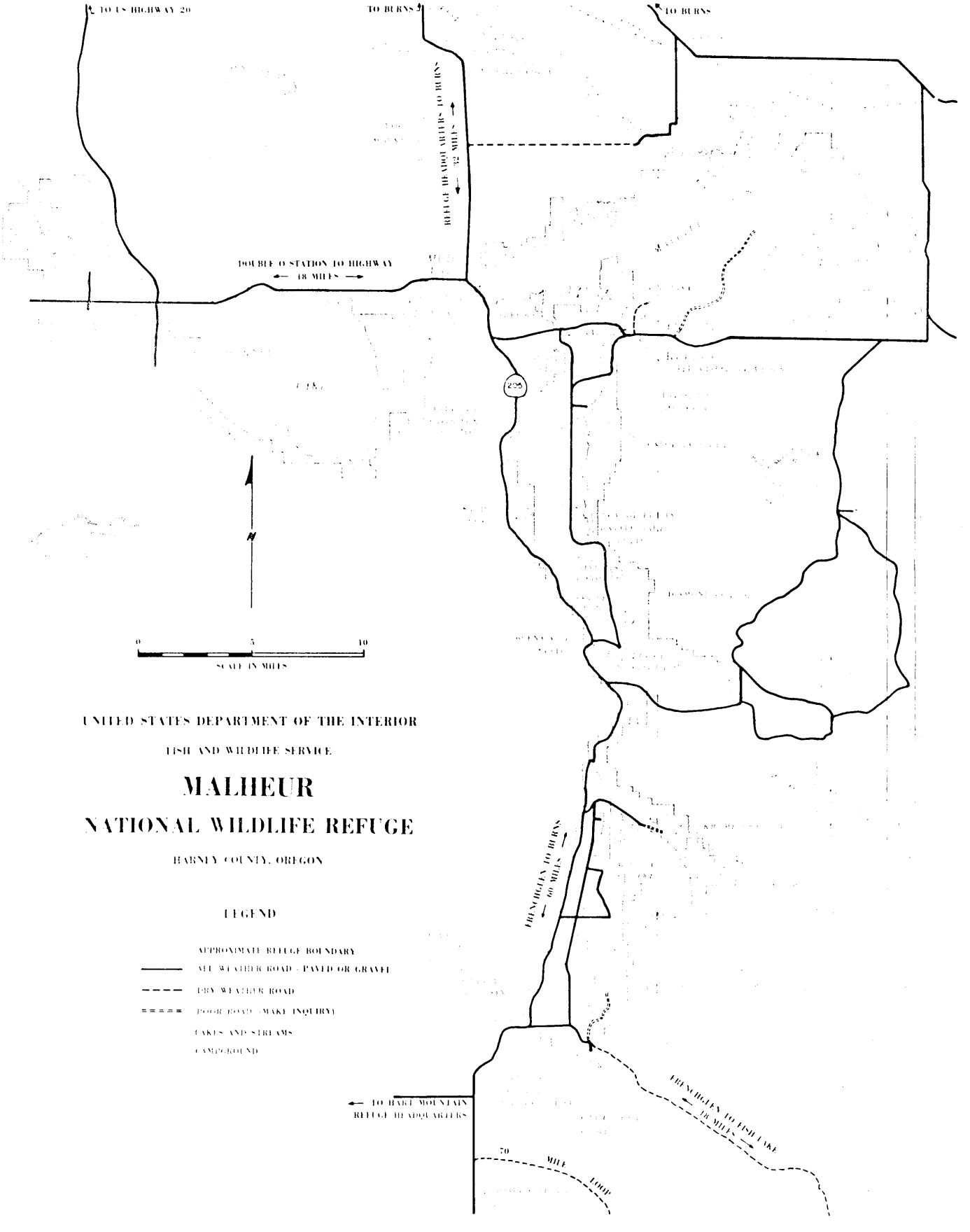
Review and Approvals

3/7/80 — Submitted By — Date

W. D. Carter 4-24-80 — Area Office — Date

MALHEUR NWR — Refuge

Regional Office — Date



UNITED STATES DEPARTMENT OF THE INTERIOR

FISH AND WILDLIFE SERVICE

MALHEUR

NATIONAL WILDLIFE REFUGE

HARNEY COUNTY, OREGON

LEGEND

APPROXIMATE REFUGE BOUNDARY

ALL WEATHER ROAD - PAVED OR GRAVEL

DRY WEATHER ROAD

POOR ROAD - MAKE INQUIRY

LAKES AND STREAMS

CAMPGROUND

Well manicured grounds at headquarters received frequent compliments from refuge visitors.

Photo: Ditto

I. GENERAL

A. Introduction

The 183,484 acre Malheur National Wildlife Refuge is located in the Malheur-Harney Lakes Basin, 32 miles south of Burns, Oregon. The Basin has no outlet to the sea. It encompasses over three million acres and has three major water sources. The Silvies River with headwaters in the Blue Mountains, drains about 1,360 square miles and flows into Malheur Lake from the north. The Donner and Blitzen River heads on Steens Mountain in the southeastern portion of the Basin. It drains a 1,000 square mile watershed and flows into Malheur Lake through the Blitzen Valley from the south. Silver Creek flows directly into Harney Lake through the Upper and Lower Warm Springs valleys from the north and drains a 900 square mile area. Harney Lake also receives water from Malheur Lake during high water years.

In the northern part of the Basin irrigated native meadows east and south of Burns are important spring migration habitat. Waterfowl, Lesser Sandhill Cranes, and shorebirds use this area extensively on their way north.

B. Climatic and Habitat Conditions

Temperatures were generally below normal in January, with a low of -23 degrees F. recorded on the first day of the month. During much of that period, ground frost extended to a depth of about 18 inches.

A short warming trend at mid-month brought snow and rain which could not soak in, and the resulting runoff caused widespread flooding throughout Harney County. Extensive damage occurred to refuge roads and water management facilities in the Upper Blitzen Valley.

Flood waters on a frozen Blitzen River pushed ice across the tour road.

Photo: Ditto

Erratic weather continued through February. Frozen ground and thawing snow produced flooding conditions throughout the refuge with the Double-O Unit hardest hit. There, approximately one mile of road, three dikes, and five water control structures were washed out.

Wintering numbers of ducks and Canada geese remained higher during this period than at the same time last year, due primarily to the availability of grain in refuge and adjacent fields and the moderating weather.

The first Steens Mountain snow survey on February 27th revealed that snow depths on our major watershed averaged 10 inches less than last year (which was 120 percent of normal), but snow moisture was 150 percent of normal.

Warm rains in early March kept the Blitzen River out of its banks from March 8th through 19th. This flooding caused additional damage and delayed the spring farming program in three of our farm units. An incredible 4.20 inches of moisture in the form of wet snow and rain was recorded at the P-Ranch Station during the January through March period. The March 30th Steens snow survey revealed 120 percent of normal moisture, with considerable runoff yet to come.

On April 7th, the privately owned Kern Reservoir dam washed out, releasing an estimated 800 acre feet of water into Krumbo Reservoir. A wall of water five to six feet high hit the reservoir, breaching the dam and causing extensive damage to the dam, spillway, and control structure. The wall of water progressed down the Krumbo Valley, washing out two major brood pond dikes and destroying several miles of interior fence. The break has rendered the 200 surface acre Krumbo Reservoir inoperative until the $166,000 in needed repair funds are received.

The collective effects of flooding during 1978 and 1979 resulted in damage amounting to an estimated $1,579,000. A request for those funds was submitted during the year.

Needless to say, breeding pair habitat was in abundance throughout the Harney Basin when our spring migrants began arriving. By April 5th, Malheur Lake was already filled with 64,000 surface acres of water and was spilling 62 cfs into Harney Lake, creating excellent conditions for migrant waterfowl and shorebirds. It had reached approximately 68,000 surface acres by June 26th, the highest level ever recorded in the 71 year history of the refuge. The combined effects of the excellent water conditions and the 1977 carp treatment resulted in very productive habitat conditions in the marsh, as is discussed in greater detail elsewhere in this report.

The weather turned hot and dry during July, with only .46 inches of rainfall received at headquarters. Irrigation supplies for field flooding and brood water remained adequate. Most of the refuge received in excess of an inch of rainfall in August, which was accompanied by a general cooling trend that helped keep range fire hazard conditions at a low level throughout the summer.

Vegetative growth in native wet meadowlands was quite good throughout the refuge. It was better than in any year that long term residents could remember in the north end of the Double-O.

Unseasonal rains in August (2.74 inches) and the cool, damp weather that prevailed through September, delayed harvesting of refuge grain fields. As a result, birds made extensive use of those areas prior to harvest.

Wet weather continued through October and November with a total of 2.94 inches of precipitation received at headquarters during that period. This further delayed the grain harvest and combining in the last field, West Swamp #1, didn't begin until December 13th. It also created periodic vehicle access problems for hunters on the Malheur Lake waterfowl hunting area.

Malheur Lake was covered by thin ice on November 9th and frozen over completely on November 20th, at which time it contained over 60,000 acres of water. The level of the marsh began to rise in October, and was still rising at the end of the year.

The comparatively "open", mild winter weather that prevailed during the last four or five months of the year, coupled with excellent feeding conditions both on and off the refuge, served to hold a larger number of birds in the Basin during this period than has been normal in recent years.

Total runoff in the three major watersheds for the 1979 water year (October 1, 1978 through September 30, 1979) was significantly above normal for the second year in a row, with 117,500 acre feet recorded for the year on the Blitzen River (45 year mean annual flow - 86,940 acre feet); a whopping 205,000 acre feet on the Silvies River (62 year mean annual flow - 120,300 feet); and 43,550 acre feet on Silver Creek (24 year mean flow - 30,720 acre feet.

Total precipitation varied from 10.78 inches at Buena Vista (7.54 inches, 10-year average) to 12.37 inches at headquarters (8.74 inches, 10 year average). Another very wet year.

C. Land Acquisition

1. Fee Title

There was no additional fee acquisition this year.

The Harney County law suit prompted by the "friendly" condemnation proceedings initiated on the McEwen tract last year was still pending at the end of the year. A meeting was held with the county and their counsel on August 13th, at their request, to discuss long range refuge acquisition plans. In addition to Refuge Manager Mazzoni, others present included representatives of the Area and Regional offices, the Regional Solicitor's staff, and the U. S. Attorney's Office.

There was some hope that this meeting might provide a basis for dismissal of the suit. However, that did not occur, and Mazzoni and certain members of the Regional Director's staff have been subpoenaed to appear before the county's counsel in Portland on January 22, 1980, for the purpose of giving oral depositions relative to the refuge acquisition program.

Fortunately, the adverse publicity that accompanied public discussion of this issue, both last year and well into the spring this year, has subsided and local feelings have cooled - at least for the time being.

Boise Area Office Staff Specialist W. D. "Pete" Carter made an aerial inspection of tracts proposed for acquisition.

Photo: Ditto

Another $37,000 of FY 79 BLHP money was received for rehabilitation of headquarters buildings. This work included installation of storm doors and thermo-pane windows in the new and old office buildings, quarters #9, quarters #14, and installation of handrails along the wooden deck in front of the office.

YACC Work Leader Judy Weider shows off new handrails at office.

Photo: Ditto

Fence construction was given high priority. There are over 650 miles of refuge fence and much of it was constructed by the CCC's. Replacement of these older fences is being accomplished with YACC and YCC personnel under the direction of the maintenance staff. A total of 6.5 miles of replacement fence was completed during FY 79.

The YCC constructed approximately 100 feet of concrete sidewalk at refuge headquarters. They also built firewood boxes for three residences and completed construction of the Diamond Point livestock corrals.

B. Maintenance

A six inch thick gravel surface was added on 6.5 miles of refuge tour road through the Wright and East Sagebrush fields with cyclic maintenance funds. Hauling was done under contract with refuge personnel doing the spreading, watering and grid rolling.

Another two miles of road in the north Double-O unit was graveled by refuge personnel with rented belly-dumps. Additional work on both roads will be completed in 1980.

2. Other

All owners of tracts in which we have an acquisition interest were contacted in August, preparatory to the meeting with the County. The reasons for our interest were explained and our willingness to negotiate "willing seller" purchase (as funds become available) or exchange was discussed. Two owners subsequently expressed an interest in selling their lands. However, in the absence of funding, no action was taken.

D. System Status

1. Objectives

Progress continued on the master plan updating process. The objective setting portion is to be completed in FY 1980.

2. Funding

A summary of FY 1973 through FY 1979 funding and permanent manpower levels follows:

	Base O&M					
FY	1210(MB)	1240(I&R)	6810	Total	Rehab	Permanent Positions
1973	227,600*		19,500	247,100		14
1974	227,700	28,400	19,500	275,600	13,500	14
1975	250,000	21,800	40,000	311,800	43,400	12
1976	239,200	50,700	40,000	329,900	53,000	11
1977	365,900	73,200	64,400	503,500		12
1978	365,900**	73,200	64,400	503,500	83,000**	12
1979	431,700	62,150	64,400	558,250	61,000	12

* Included I&R

** Funding total for FY 78 includes cyclic maintenance - $60,000 (1210) $35,000 (1240). Rehab for FY 78 includes $78,000 (1210) - $5,000 (1240).

II. CONSTRUCTION AND MAINTENANCE

A. Construction

Installation of the new headquarters water system started in FY 78, but was not completed until November 1979. Complications with archeological site compliance reports brought about a one year delay which increased the project's cost from $87,000 to $100,000+. Consequently, $24,000 scheduled for BLHP construction of a new water system at Buena Vista Station in FY 79 was diverted to the headquarters project.

Resurfacing of Double-O roads was done with rented belly dumps.

Photo: Ditto

Several culverts were installed or replaced. A seven foot diameter pipe replaced an inadequate five foot culvert in Stubblefield Canal. A 24-inch pipe with screw gates was also placed in Stubblefield Canal. Two 60-inch pipes were installed through the Peterson Field road, while five 48-inch culverts were set in McCoy Creek Canal, the tour road through the Wright Field, the east side of Lava Bed Field, and Knox Field.

Jess and Yriarte installing a 7' diameter culvert in Stubblefield Canal at the Rockyford Lane Crossing.

Photo: Ditto

Dike and ditch rehab work included the Peterson Field dike and the Skunk Farm Pond ditch. The toe drain around the Diamond Grain Field (West Center Field) was cleaned to lower the water table in that area.

Other major maintenance projects included the replacement of the P-Ranch foot bridge and the Benson Boat Landing road and Bridge Creek bridges; overhauling the steering clutches and transmission on the D-8 crawler tractor and an engine overhaul on a "Joy" trailer-mounted air compressor; construction and/or repair of loading ramps at P-Ranch and Double-O stations; reroofing of the historic Brenton Cabin; removal of five old buildings from Malheur Lake; remodeling of the YACC Office and conversion of six miles of Blitzen Valley boundary fence from five wires to four to permit less restricted crossing of deer and antelope.

YACC enrollees rebuilding the Benson Boat Landing bridge over the Blitzen River.

Photo: Ditto

In November, a local tree surgeon (and we use the term loosely) was contracted to work on a number of large trees at Buena Vista Station. Some of the trees were diseased and almost all of them contained so much dead wood as to pose a safety hazard. Additional tree work is planned for the headquarters and Double-O Station in 1980.

YACC and YCC enrollees assisted refuge personnel on many of these projects. The YCC also repainted Sodhouse School as a community project. The YACC crews handled all headquarters lawn work, which is a major accomplishment in itself.

C. Wildfire

Nothing to report.

III. HABITAT MANAGEMENT

A. Croplands

During 1979 we had planned to farm approximately 1,635 acres in the Blitzen Valley. Of this total the refuge farmed 14 acres and the remainder was to be worked on a sharecrop basis by Harlan Crawford of Burns, Oregon. As in 1978, spring runoff was high and flooding occurred. Consequently, farming operations were curtailed in several fields. Following is a list of fields, crops, yields, and acres planted:

Field	Acres Planted	Crop	Harvested Yield (tons)
West Center (Diamond)	flooded	----	---
East Buena Vista	flooded	----	---
Suicide	flooded	----	---
Lava Bed	75	wheat	50
	75	barley	50
Upper Grain Camp	20	wheat	15
	30	barley	20
East Grain Camp	340	barley	155
West Swamp	240(140_{harv})	barley	75
West Knox Field	60	barley	75
Sodhouse Field	14	barley	not harvested - negligible yield
TOTAL	834 acres		575 tons

The refuge share on most fields was 20% of the standing crop. The share in the Lava Bed, West Swamp and Knox Fields was 10%, but will go to 20% next year on all but one field.

Canada Thistle and White Top were still causing problems in the Lava Bed and West Swamp fields. Both were aerially sprayed with 2,4-D, but some weed problems were still encountered in several fields at harvest time.

The farmer attempted to let early frosts kill the weeds before trying to combine several fields. Unfortunately (for him), this delay backfired as rising water tables and fall rains halted harvesting two fields until the week before Christmas. The birds took full advantage of the situation and reduced 240 acres of grain to 140 acres of harvestable crop in the West Swamp Field.

Frosts in late May did considerable damage to emerging crops in Lava Bed and West Swamp fields where crop acreage was reduced by as much as half.

B. Grasslands

Since the comparatively small amount of true grassland occurs on the margins of the refuge and is interspersed with the predominant native wet-meadow wetland type, in most cases it is managed contiguous with the wetlands discussed in the next section.

The Dredger Field #1 crested wheatgrass seeding was totally deferred from grazing to give it one complete year of rest. General observations indicated that less use was made of the seeding by Canada geese than when it was grazed.

The Krumbo Reservoir Field crested wheatgrass seeding was grazed for the first time in six years, during the period November 1st through December 15th. Grazing at this period should enhance the attractiveness of the field to geese next spring.

C. Wetlands

Water management objectives are to have impoundments at operating level by March 1st and to flood-irrigate meadows in priority order for use by spring migrants and breeding pairs. After the spring runoff is over, efforts are made to hold water in channels in the meadows for brood use.

Ponds were filled and fields irrigated on schedule, with a few exceptions. Because of damaged check dikes and silted in channels, some fields east of the Center Patrol Road in the Upper Blitzen Valley could not be properly irrigated. Water distribution problems caused Dredger Field and West Swamp Field #2 to be flooded later than scheduled. As a result, these fields did not attract as many nesting Sandhill Cranes as in the past several years.

Ample water was available throughout the nesting season as a result of one of the best water years on record. In some cases, this abundance of water adversely effected refuge wetlands. The partial washout of Krumbo Dam resulted in extensive damage to ponds, dikes, and control structures in the Krumbo Valley below the dam. Upper Krumbo Pond was completely washed out, and a number of Canada goose nests were destroyed on islands in the pond. Krumbo Swamp Pond was damaged, but it held good water throughout the year and received heavy bird use.

West Knox Pond was held dry and used as a grain field. Ditches around the grain field were flooded in September to encourage waterfowl use of excellent stands of smartweed that had developed during the growing season.

Benson Pond was partially drawn down about August 1st to expose mud flats and enhance shorebird use. East Buena Vista Pond was partially reflooded in September to provide crane roosting habitat. Both of these actions resulted in excellent bird response.

Malheur Lake acreage gradually decreased from the June peak of 68,000 acres to about 55,000 surface acres in September. It was back up over 60,000 surface acres by late fall. When Malheur Lake reached 57,500 surface acres, water begins to flow through the Narrows and Mud Lake into Harney Lake. Harney Lake was nearly filled during 1979 and in December was still over 60 percent full. A stand of alkali bulrush on the southwest side of Harney Lake received extensive Snow Goose use during the fall migration and has been colonized by muskrats.

Yriarte spraying white top in Lava Bed Field.

Photo: Ditto

Chemical control of noxious weeds was limited to spot treatment of white top (Hymenophysa pubescens) in the Double-O, around the Sod House Ranch headquarters, and in the Lava Beds Field. Spot spraying of three localized patches of Canada thistle (Cirsium arvense) in the Double-O represented the extent of our efforts to control this species.

Pre-emergent chemical treatment of weeds in several of the refuge grain fields by the share crop farmer was authorized, and is discussed in more detail in Section III. A. Croplands.

Local pressure from Harney County, the Soil and Water Conservation District, and the County Extension Office to take a more active role in noxious weed control continued. In fact, it even became an issue with the local District Attorney who joined with efforts to get the refuge to "cooperate" with noxious weed control programs on private lands.

Efforts to implement a rotational scheme of vegetation manipulation to improve the quality and quantity of nesting habitat continued. Livestock use during the 1978/79 forage production year totaled 48,222 AUM's, a 17 percent reduction from 1977/78 (58,214) and a 62 percent reduction since 1973 (126,593). A total of 4,973 tons of hay was harvested and hauled off the refuge from fields that were partially hayed, but not grazed.

D. Forest Land

Not applicable.

E. Other Habitat

Nothing to report.

F. Wilderness and Special Areas

There was no action on the Malheur Wilderness proposal. At the request of the Oregon High Desert Study Group, Refuge Manager Mazzoni presented a slide discussion of the proposal at the monthly meeting of the Portland Audubon Society on October 19th. Interestingly, while the group was enthusiastic about the ecological and scenic values of the proposed Harney Lake Wilderness Area and continued management for preservation of its natural character, several people questioned the need for wilderness designation. Once assured of the area's already existing ownership and control within the Refuge System, several present questioned the wisdom of the formal wilderness review/designation process.

In the apparent absence of any strong citizen support for this proposal, it seems unlikely there will be any Congressional effort to have it designated as a unit within the wilderness preservation system, especially in the face of the strong local opposition that was expressed during the public hearings held in 1967. Until Congress (presumably) reaches a decision one way or the other, the proposal remains in limbo.

The P-Ranch and Sod House Ranch historic sites were formally approved for addition to the National Register of Historic Places. The Double-O Ranch NHRP nomination is still pending.

Off-road vehicle trespass continues to be a problem within and adjacent to the sand dune formations in the northern part of the Harney Lake National Research Natural Area. Increased effort is planned in 1980 to monitor and control illegal off-road use.

IV. WILDLIFE

A. Endangered and Threatened Species

1. Endangered

One American Peregrine Falcon was observed on July 8th by C. D. Littlefield, two-and-one-half miles east of Refuge Headquarters, on the south side of Malheur Lake. Another possible sighting was reported from Catlow Valley, south of the refuge.

2. Threatened

The Bald Eagle winter roost site located in December 1978 by refuge staff member Steve Thompson and Gary Wing of the Bureau of Land Management was monitored through April 25, 1979. The peak was 31 Bald Eagles observed on January 28, 1979. Counts ranged from 17 to 31 between January 7, 1979 to March 8, 1979. On March 23, 1979, only four Bald Eagles were observed at the roost site.

During March waterfowl census flights in the Harney Basin a special effort was made to count Bald Eagles. On the 7th and 8th, 45 Bald Eagles were observed, while 78 Bald Eagles were counted on March 14th and 15th.

One immature Bald Eagle with yellow patagial wing markers was observed at the roost. This bird was apparently marked at Glacier National Park, Montana.

The winter roost area was visited by Steve Thompson three times in November and December 1979. On November 28, 19 Bald Eagles were observed (7 adults, 12 immatures), on December 5, 19 were also counted (8 adults, 11 immatures), and on December 17, 11 Bald Eagles were seen (8 adults, 3 immatures).

3. Other Species of Special Interest

An estimated 150 pairs of White-faced Ibis nested on Malheur NWR in 1979. This estimate is down 21 percent from the 1978 figure of 190. However, the number of nesting pairs was still well above the 14-year average (1966-1979) of 56 pairs. Table 1 summarizes all colonial nesting pair estimates for this period. A status review of this species is needed.

Dr. Steve Herman reported 50 Western Snowy Plovers on Harney Lake this year compared to 52 in 1978. Snowy Plovers nest on the south side of Harney Lake. An investigation of the status of this species in eastern Oregon and parts of northern Nevada will begin in 1980.

TABLE 1

Colonial Nesting Species - Malheur NWR - Malheur Lake Nest Estimates

SPECIES	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979
Double-crested Cormorant	125	50	50	45	50	45	70	85	75	60	40	70	20	80
Great Blue Heron	200	125	100	110	100	110	150	200	200	210	190	200	41	205
Black-crowned Night Heron	600	250	500	600	500	750	750	775	1000	360	400	375	526	730
Great Egret	400	200	400	235	180	150	285	230	360	100	200	125	401	415
Snowy Egret	50	60	150	60	55	35	80	125	140	55	80	50	137	40
White-faced Ibis	10	15	20	20	25	20	25	55	80	40	25	110	190	150
Franklin's Gull			100	205	325	400	500	1000	1000	0	200	10	519	1100
California Gull							10	80	10	0	0	0	0	0
Ring-billed Gull								25		0	0	0	0	0

B. Migratory Birds

In addition to refuge population surveys, the refuge staff took over full responsibility for population surveys in the Harney Basin on January 1, 1979. The basin surveys and many of the refuge surveys had been conducted by Ecological Services personnel in conjunction with their Harney-Malheur Lakes Basin study.

1. Waterfowl

Maintenance use by all waterfowl, except geese, was up from 1978 (see Table 2). Total waterfowl use days were the highest since 1972. The combination of excellent water supply and continued ample supply of submergent vegetation in Malheur Lake following carp control in 1977 were major contributing factors.

TABLE 2

Comparison of Waterfowl Use Days

(1975 - 1979 to Refuge Objectives)

	Objective	1975	1976	1977	1978	1979
Swans	449,000	606,120	558,420	254,420	148,374	366,878
Geese	6,000,000	1,995,690	2,381,790	1,705,740	1,804,075	1,666,388
Ducks	40,000,000	10,786,380	11,974,110	6,468,870	14,492,629	15,679,996

a. Swans

Whistling Swan use was up 257 percent over 1978, with a peak of 8,100 swans during spring migration and 7,235 during fall migration. The abundance of submergent vegetation contributed to the increase in use days.

This was the record year for Trumpeter Swan production at Malheur. Although the breeding population remained about the same as in recent years, 33 cygnets were produced. The previous refuge production record was 22 in 1971.

b. Geese

Spring migration of Snow geese peaked at 24,000, while the fall peak was 8,000. These figures are down from 1978.

Canada goose production (1,295) increased 140 percent over 1978 (929). This was the second highest production since 1972 (see table 3), but still below the 15 year average of 1,338. A number of nests were flooded this year and egg predation remains an important factor in nest failure.

TABLE 3

1979 Waterfowl Production, Malheur NWR

Rank	Species	Rounded Total
4	Mallard	5635
3	Gadwall	7650
7	Pintail	1640
9	G.W. Teal	510
2	B.W./Cinn. Teal	7795
10	Am. Wigeon	330
6	No. Shoveler	2480
	DABBLER TOTAL	26,040
1	Redhead	15,750
8	Canvasback	1255
11	L. Scaup	170
5	Ruddy	4570
12	C. Merganser	110
	DIVER TOTAL	21,855
	TOTAL DUCKS	47,895
	C. Goose	1295
	T. Swan	33
	TOTAL WATERFOWL	49,225
	Am. Coots	22,815

c. Ducks

Migrant duck use-days were up again in 1979. The spring peak of 95,000 compares to 66,000 in 1978 and 48,000 in 1977. The fall peak was 90,500 compared to 95,000 in 1978.

Several thousand mallards fed on grain in East Grain Camp Field.

Photo: Ditto

This year's 19,758 breeding pairs were up 31 percent over 1978 and 189 percent over the drought year of 1977. An estimated 47,900 ducklings were produced to flight stage in 1979. That is the highest duck production on the refuge since 1955 (67,830). Most of this increased production was due to the excellent condition of Malheur Lake, as 22,619 ducks were produced in the lake. Of those, 18,402 were divers, including 13,113 Redheads, 4,147 Ruddy ducks, and 1,080 Canvasback ducks. The Double-O area of the refuge was second only to Malheur Lake in total duck production and was by far the highest producer of dabbling ducks. The Double-O produced 8,853 dabblers or 34 percent of the refuge total. Cinnamon Teal were the most common dabblers nesting on the refuge, followed by Gadwall and Mallards.

d. American Coots

Coots continued to thrive on Malheur NWR in 1979. The spring peak was 64,650 coots while the fall peak was an amazing 129,295. Production was very high as well, with an estimated 22,812 coots produced. The fall peak was the highest since 1966.

2. Marsh and Water Birds

Horned Grebes were observed nesting in Pintail Pond and in the Double-O. At least four nests were located. This species is the least common of the grebes that occur on the refuge.

One colony of 1,200 pairs of Eared Grebes on Harney Lake was apparently unsuccessful. Another colony northwest of Harney Lake was abandoned after water levels began to recede. A colony of 15 Eared Grebes in the Double-O area abandoned their nests. Some smaller colonies on the refuge were successful, but this species generally had a poor nesting year.

The Pied-billed Grebe population was up somewhat this year. Young Pied-billed Grebes were first seen on May 14th in Malheur Lake and on May 31st in the Blitzen Valley.

Western Grebe populations were up on Malheur Lake with an estimated 700 pairs using the marsh during the nesting season. Production on the marsh appeared to be high.

For the second year in a row a helicopter was used to census colonial nesting birds on Malheur Lake. All colonial water bird pairs, except Snowy Egrets and White-faced Ibis, were up from 1978 (see table 1). Two adult Cattle Egrets and one immature were observed five miles north of Malheur Lake on September 5, 1979.

White Pelican numbers were lower than normal, and their status remains uncertain. A pelican egg was found floating in Malheur Lake in July, indicating that some of these birds were in reproductive condition even though no nesting has been observed on the refuge since 1960. A pelican found dead in Malheur Lake had been banded in 1976 at Pelican Lake, Lake County, Oregon.

Sandhill Crane fall use was excellent this year. Malheur is a fall staging area for most of the Central Valley Population of Greater Sandhill Cranes. Although the Cranes peaked at 3,400 by the end of October, age ratio determinations indicated a poor recruitment rate of 6.2 percent. The status of the Central Valley Population remains uncertain.

3. Shorebirds, Gulls, Terns, and Allied Species

During the aerial survey of colonial nesting birds, 1,100 pairs of Franklin's Gulls were counted. This was the largest number ever known to nest on the refuge and was over twice the number that nested in Malheur Lake in 1978.

Shorebird use days were up 161 percent over 1978 with 1,534,889 use days being recorded for 1979. Use days for gulls and terns reached 497,760 in 1979.

The Double-O continues to be a major shorebird nesting area. Nest sites of shorebirds in the Double-O were generally in very short vegetation with little visual obstruction. These areas seldom contained residual vegetation, but if present, the residual vegetation was usually saltgrass (Distichlis stricta).

Eleven Black Tern nests were located during nest searches in the Double-O. Of these nests, 77.7 percent were successful. Two of the nests were built on floating "cow pies".

In the past, Stinking Lake has been the most important area for fall shorebird use. This year the fall shorebird use shifted from Stinking Lake to Harney Lake. This may have been due to the high level of Stinking Lake and the lack of shore flies (Genus Ephydra). As many as 22,000 Western Sandpipers were observed on the shores of Harney Lake.

A Parasitic Jaeger was seen by Dr. Steve Herman at Harney Lake on July 5th. This was the fourth record for the refuge and the first record of a light-phased Parasatic Jaeger.

4. Raptors

This was a good year for all raptors. Quarterly raptor surveys were conducted to determine the relative densities of raptors using the Harney Basin. The results of these surveys are presented in Table 4.

Although the 1979 nesting season was a good one for Golden Eagles, production was significantly lower than in 1978. Nesting success was 88.2 percent (n=17) and fledging success per successful attempt was 1.53 (n=5). Table 5 summarizes nesting success and fledging success from 1976-1979. We estimate that at least 89 eagles were produced in 1979 at the 66 known traditional nesting sites in the area. To the best of our knowledge, the fifteen years of reproductive data collected by the refuge staff on Golden Eagles is one of the longest eagle studies in the world.

Red-tailed Hawks were the most common buteo hawk nesting on the refuge. During 1979 four active nests were found and at least ten young were fledged from these nests. A Swainson's Hawk nest site in the Krumbo Valley that was active in 1978 was not active in 1979.

At least three Prairie Falcon nests were active on the refuge in 1979 and at least eight young falcons were fledged. Four American Kestrel nests were found to be active, but information concerning the number of fledged was not collected.

TABLE 4

Raptor Numbers Observed on Quarterly Surveys in 1979
Malheur-Harney Lakes Basin

	Winter[1]	Spring[2]	Summer[3]	Fall[4]
Turkey Vulture	0	12	111	185
Sharp-shinned Hawk	1	1	0	0
Cooper's Hawk	0	0	0	2
Red-tailed Hawk	8	16	29	67
Swainson's Hawk	0	1	8	20
Rough-legged Hawk	82	34	0	0
Ferruginous Hawk	0	2	3	1
Golden Eagle	11	17	13	5
Bald Eagle	3	2	0	0
Marsh Hawk	27	45	18	57
Unidentified Hawk	4	3	1	0
Prairie Falcon	4	4	4	2
American Kestrel	3	40	17	28
Great-horned Owl	4	1	4	0
Burrowing Owl	0	2	9	0
Short-eared Owl	0	0	4	0
Northern Shrike	0	0	0	0
Loggerhead Shrike	10	7	7	4
Long-eared Owl	0	2	0	0
Unknown Falcon	0	0	0	4
TOTAL	157	189	228	375

[1] Winter survey conducted during December of 1978

[2] Spring survey conducted April 8th through 12th, 1979

[3] Summer survey conducted June 8th through 15th, 1979

[4] Fall survey conducted August 24th through September 4th, 1979.

TABLE 5

Comparative Golden Eagle Nesting and Fledging
Success from 1976 - 1979

YEAR	NESTING SUCCESS (%)	MEAN BROOD SIZE AT FLEDGING
1976	75.0	1.60
1977	75.0	1.13
1978	93.0	1.88
1979	88.2	1.53

Biologist Technician Richard Johnstone surveyed the refuge for nesting owls. He found that at least 27 Great Horned Owls, 18 Short-eared Owls, and 12 Long-eared Owls nest on Malheur Refuge. Tables 6, 7, and 8 summarize the information gathered in his surveys. Three Barn Owl nests were located this year. Our most common owl is the Great Horned Owl. Johnstone's data indicates there may be as many as 150 pairs of Great Horned Owls on the refuge.

Great Horned Owl Photo: Ditto

TABLE 6

Breeding Chronology of the Owls
of
Malheur National Wildlife Refuge
1979

Species	Mean Egg Laying	Mean Hatching	Mean Fledging
Great Horned Owl	March 5 (Feb. 26 - Mar. 12) (n=4)	April 1 (Mar. 25 - Apr. 8) (n=4)	May 28 (May 18 - Jun. 4) (n=6)
Long-eared Owl	April 11 (Mar. 13 - May 1) (n=8)	May 3 (Apr. 5 - May 26) (n=8)	May 28 (May 1 - Jun 21) (n=8)
Short-eared Owl	May 17 (Apr. 25 - Jun. 12) (n=7)	June 1 (May 2 - Jul. 7) (n=7)	------ (Jun. 15 - Jul. 14)

TABLE 7

Productivity of the Owls
of
Malheur National Wildlife Refuge
1979

Species	Mean Clutch	Mean Maximum Brood	Mean No. Fledged/Pair
Great Horned Owl	2.40(1-4) (n=5)	2.25(1-3) (n=4)	1.75(0-3) (n=12)
Long-eared Owl	5.20(4-6) (n=10)	3.90(0-6) (n=10)	3.40(0-6) (n=10)
Short-eared Owl	5.83(4-9) (n=18)	3.50(2-5) (n=6)	2.33(2-3) (n=3)

TABLE 8

Nesting Success of the Owls
of
Malheur National Wildlife Refuge
1979

Species	No. Pairs	No. Attempts	No. Succ. Attempts	% of Pairs Breeding	Nest Success % Prs.	Attempts
Great Horned Owl	12	12	10	100.0	83.3	83.3
Long-eared Owl	11	10	8	91.0	72.7	80.0
Short-eared Owl	11	11	5	100.0	45.5	45.5
Barn Owl	2	2	2	100.0	100.0	100.0

Marsh Hawks were an abundant nesting bird in the Blitzen Valley and around Malheur Lake. Turkey vultures were quite common during August and September. A noticeable migration of Swainson's Hawks occurred in late August and early September.

The wintering raptor population consisted primarily of Rough-legged Hawks, Great Horned Owls, and Marsh Hawks, in that order of abundance. A number of Bald Eagles and Golden Eagles also winter in the Harney Basin.

5. Other Migratory Birds

The spring migration of birds continues to be a major attraction to visitors. Favorite songbird areas are the trees at headquarters, Benson Boat Landing, Benson Pond, and the stands of willows in the Upper Blitzen Valley.

One male Scarlet Tanager was observed at refuge headquarters on May 31. This is the first record for the refuge and may be the first state record for this species.

A rare Red-eyed Vireo was seen at refuge headquarters on September 21. A Magnolia Warbler was observed by C.D. Littlefield at refuge headquarters on September 28. Although unconfirmed sightings were reported in September 1978 and early September 1979, this was the first documented record for the refuge.

Although most Bobolinks that nest on the refuge are concentrated near the P-Ranch, Biological Technician Gary Ivey located a colony of 28 males and at least 17 females about one mile southwest of refuge headquarters.

C. Mammals and Non-Migratory Birds and Others

1. Game Mammals and Furbearers

A herd of 20-30 pronghorn were seen several times just north of the Double-O Station. Smaller groups were seen occasionally in various other areas of the refuge.

The number of mule deer counted on the annual transect routes in the fall was up substantially over 1978. The closure of deer archery hunting in the Upper Blitzen Valley of the refuge coincided with the opening of a state archery season in the surrounding area. This appeared to result in an influx of deer into the refuge and improved visitor observation opportunities.

Approximately 20 head of mule deer spent the rutting season within the headquarters compound before moving back to the juniper slopes for winter.

Photo: Ditto

Beavers are common in the Blitzen Valley. Whenever possible beavers and their lodges are protected. No trapping permits were issued during the year; however, certain beavers continue to cause problems by plugging water control structures in a number of areas.

The muskrat population on the refuge is increasing from very low levels in 1977 and 1978. The number of "rat" houses in Malheur Lake has increased substantially and muskrat sightings are again becoming more common. Canada Geese make extensive use of muskrat houses for nest platforms in Malheur Lake. No muskrat trapping permits were issued in 1979.

Raccoons, weasels, and mink were relatively common on the refuge.

2. Other Mammals

A rare Malheur or Preble's shrew (Sorex preblei) was collected along the Blitzen River between refuge headquarters and Benson Boat Landing in June.

Coyotes continue to be highly visible and common on the refuge. No coyote control was conducted on the refuge during 1979. Coyotes continue to destroy a number of eggs of ground nesting birds each year. Their impact on young and adult birds has not been determined; however, during certain times of the year coyote scats predominantly composed of feathers have been collected.

Jackrabbits appear to have declined considerably in numbers in 1979. If this trend continues, increased egg predation by coyotes and ravens may result from a decrease in the food base. Decreased reproduction of Golden Eagles may also result.

Rodent populations, particularly voles and kangaroo rats, remained high during the year. Vagrant shrews (Sorex vagrans) are quite common in the wet meadow areas of the refuge.

3. Resident Birds

Ring-necked Pheasants enjoyed a good year. Their numbers appeared to be considerably higher than in 1978. California Quail and Chukars were also quite common. Sage Grouse were occasionally seen in the Double-O area.

V. Interpretation and Recreation

Public use totaled 31,325 visits, which is down 16.3 percent over CY 78. This drop is attributed to the uncertainty of gasoline supplies and prices, plus a general tightening of the economy. A visitor use survey, conducted mainly by YACC youths, was completed to update public use data gathering techniques.

A. Information and Interpretation

1. On-Refuge

The refuge tour route and headquarters museum each attracted 30 percent of the year's visitors.

Malheur Field Station classes and groups again made use of the two research natural areas for educational purposes. This use plus a few additional groups tutored by refuge personnel, accounted for 1,912 visits and 4,852 activity hours of environmental education.

2. Off-Refuge

Forty articles were written by refuge personnel for the weekly Burns Times-Herald. Manager Mazzoni continued his public relations work with Burns civic organizations and as Chairman of the High Desert Parks and Recreation Board of Directors. Assistant Manager Ditto attended regular meetings of the Burns Rotary Club.

Off-refuge personal contacts, other than in Burns, are limited due to the remoteness of this refuge.

B. Recreation

1. Wildlife Oriented

A deer archery hunt was not held this year. It was dropped because the Oregon Department of Fish and Wildlife opened most of the state to archery deer hunting for the first time. This provided archers with ample area to hunt off-refuge. Also, some conflicts with other refuge uses were apparent, especially wildlife observation. Plans are to make this a permanent action.

All hunting accounted for 3 percent of this year's visits. The Blitzen Valley pheasant hunt attracted 125 visits for a take of 85 roosters. The Upper Blitzen Valley upland game bird hunting area was open during the last nine days of the state season. The north half of Malheur Lake was again open during the state waterfowl season (October 13 through January 13, with a daily bag of 7, including not more than 2 combined redheads and/or canvasbacks).

Malheur Lake held good populations of all expected waterfowl species with a fall peak of 98,000 ducks on October 31. This included a peak of 21,000 canvasbacks. Hunters had little problem getting two canvasbacks or redheads. However, limits were hard to fill. The lake remained high through the season with 58,000 acres recorded on November 8th. High water dispersed the birds and excellent water, an abundance of sago and alkali bulrush in the Unit 6 closed area held the majority of wigeons, pintails and mallards until freeze-up on November 20th.

Excellent hunting weather prevailed with some precipitation recorded on 22 days from opening through November 20th!

A hunting club (Malheur Lake Sportman's Association) purchased the Cargill ranch this past year. The club closed the semi-public access road which also passes through their property. The group agreed to allow public access via the west access road on the Thursday before the opener for the 1979-80 season only. Hopefully, this issue will be resolved before the 1980-81 hunt.

TABLE 9

Waterfowl Hunt - Malheur Lake

Year	No. Hunters	Bagged Birds Per Hunter	Cripples Per Hunter	Total Harvest (Bag)	Total Kill	#1 Species in Bag	No. and % of #1 Species
1971	1,608	2.8	.61	4,503	5,456	Gadwall	1,178 22%
1972	1,564	1.3	.37	2,033	2,666	Gadwall	1,049 42%
1973	521	2.2	.39	1,146	1,164	Gadwall	401 35%
1974	555	2.3	.50	1,277	1,581	Gadwall	855 54%
1975	962	1.8	.37	1,732	2,072	Gadwall	614 35%
1976	593	1.7	.41	1,008	1,270	Gadwall	436 34%
1977	NO HUNT - LOW WATER - CARP CONTROL						
1978	1,140	4.6	.60	5,261	5,945	Am. Wigeon	1,579 30%
1979	1,110	3.0	.60	3,262	3,928	Gadwall	626 19%

TABLE 10

Hunter Survey Comparisons - Malheur Lake

Species	1948-56(7 yrs.) No.	%	1974-78(5 yrs.) No.	%	1979-80(1 yr.) No.	%
Mallard	373	20.8	273	13.8	473	14.5
Gadwall	209	11.7	592	30.1	626	19.2
Wigeon	361	20.2	432	22.0	457	14.0
Pintail	272	15.2	256	13.0	222	6.8
G.W. Teal	99	5.5	83	4.3	277	8.5
Cinn. Teal	3	0.2	8	0.4	13	0.4
Shoveler	96	5.4	82	4.3	72	2.2
Wood duck	1	0.0	2	0.1	0	0.0
Redhead	80	4.6	127	6.4	284	8.7
Canvasback	266	14.9	57	2.9	460	14.1
Ring-neck	2	0.1	21	1.1	91	2.8
L. Scaup	9	0.5	10	0.5	65	2.0
Com. Goldeneye	4	0.2	5	0.2	0	0.0
Bufflehead	4	0.2	10	0.5	13	0.4
Ruddy	5	0.3	5	0.2	91	2.8
White-winged scoter	1	0.0	0	0.0	0	0.0
Com. Merganser	3	0.2	3	0.2	0	0.0
Hooded Merganser	1	0.0	1	0.0	0	0.0
Unknown					118	3.6
TOTALS	1789	100.0	1967	100.0	3262	100.0
Canada goose	169	57.5	64	84.2	120	92.3
Snow goose	109	37.1	1	1.3	10	7.7
Ross' goose	3	1.0	10	13.2	0	0.0
White-fronted	13	4.4	1	1.3	0	0.0
TOTALS	294	100.0	76	100.0	130	100.0

TABLE 11

Bag Checks by Refuge Personnel vs.
Voluntary Questionnaire Cards
(Opening Weekend 1979)

Species	Bag Check No.	%	Questionnaires No.	%
Gadwall	54	19.2	19	21.6
Redhead	52	18.5	10	11.4
Mallard	45	16.0	16	18.2
Canvasback	38	13.5	15	17.0
Pintail	34	12.0	14	15.9
Am. Wigeon	27	9.6	8	9.1
No. Shoveler	12	4.3	3	3.4
G.W. Teal	10	3.6	2	2.3
Cinn. Teal	3	1.1	1	1.1
Ruddy	3	1.1	0	0.0
Ring-necked	3	1.1	0	0.0
TOTALS	281	100.0	88	100.0

Surprisingly, all species lined up by percentages except the Redheads! Most hunters do not know what species female redheads are - even in the hand.

A new signing method was employed during the Blitzen Valley pheasant hunt to eliminate off-road vehicles. All permittee trails were posted with the standard "Closed Area" signs with "To Vehicles" added with red spray paint at the bottom. This not only eliminated off-road vehicles, but effectively stopped indiscriminate camping as well.

Large signs (4' x 6') stating "HUNTER INFORMATION", with hunting leaflets attached, were erected at all entrances to the Blitzen Valley pheasant hunt and the Malheur Lake waterfowl hunt.

Mazzoni was very happy to see a "hunter" had used some of the new signs for target practice.

Photo: Ditto

On September 3, a local visitor reported a hawk shooting on Steens Mountain to refuge personnel with good descriptions and a license plate number. He observed the party shoot at about 20 hawks, killing one Redtail. Follow up by Federal Game Agent Coleman resulted in the successful prosecution of one individual who paid a $55 fine in Federal Court.

Three trespass horses belonging to a local rancher were impounded in October with the cooperation of BLM personnel and held in the BLM Wild Horse Corrals pending a public auction, for a total of $175 in costs. He paid the costs and claimed his horses. The rancher had received prior warnings on similar violations.

Sign vandalism was frequent in November. Three large hunting area signs were pulled up twice and two others were shot. The large Highway 205 directional sign and the Malheur Field Station signs were shot repeatedly throughout the year.

Several furniture items belonging to one of our summer temporary employees, Gary Ivey, were stolen from his refuge residence at Sod House Ranch in September. A generator and associated hook-ups were stolen from the Oliver Springs area around December 8th. Both thefts were reported locally and to the FBI. No progress was made on either case as of the end of the year.

Following is a list of violations prosecuted through the efforts of state and federal enforcement personnel:

7 - Duck Stamp warning (not signed or juvenile)

2 - No Duck Stamp

6 - Shooting Protected Species (3 dowitcher, 2 cormorant, 1 hawk)

2 - Exceed Daily Bag (canvasback)

2 - No Angling License

1 - Hunting in Closed Area

1 - Angling - Prohibited Method

1 - Unplugged Gun (warning)

VI. OTHER ITEMS

A. Field Investigations

1. MLH-13: Effects of Mowing and Grazing and Vegetative Communities on Nesting Ecology of Ducks at Malheur NWR

This study was conducted from 1974 to 1978 by Dr. Robert Jarvis and his graduate students from Oregon State University. An interim report was received from Dr. Jarvis in October 1979 and the final report is due in October 1980. This study was extended through the field season of 1979 by the refuge staff. Most of the field work was completed by Biological Technician Gary Ivey. A summary of the 1979 results follows.

a. Objectives

(1) Determine the effects of mowing and grazing on species composition, reproductive chronology, nest density, nesting success, and production of ground nesting birds.

(2) Determine the effects of water distribution and selected parameters of vegetative communities on nest site selection.

The sample size of nests found in this study was low (58 nests). Any conclusions drawn from this data should be regarded as tentative.

Breeding pair counts showed Cinnamon Teal, Gadwalls, and Mallards were the most frequently recorded duck species on the study area in 1979. Densities of breeding pairs were highest on plots idle one season. During week 7 (May 13 - 19), plots idle one season had breeding pair densities more than 2.5 times greater than plots under other treatments.

Tall grass was the most frequently used nesting cover on all study plots. Ducks selected tall grass cover on the plots idle one season over tall grass on plots within the other treatments.

The earliest duck nest (April 6, 1979) found in this study was initiated on the Knox Field, idle five seasons. Ducks nested earlier and longer through the nesting season on plots idle five seasons, and ducks nested later and had a shorter nesting season on mowed and grazed plots.

Nest densities were higher on plots idle one season than in plots under the other treatments.

Plots idle for five seasons showed the highest rate of nesting success, while plots mowed and grazed showed the lowest rate of nesting success. Using the Mayfield method for determining nest success, plots partially mowed showed the highest rate of success, and plots mowed and grazed showed the lowest rate of nest success.

More early nests were destroyed by predators than late nests, while more late nests were abandoned than early nests. Avian predators were the major predators on early nests while large mammals were the major predators on later nests.

Densities of ducklings produced were highest on plots idle for five seasons, and lowest on mowed and grazed plots.

Comparing all areas of grazed and/or mowed vegetation to all areas of idle vegetation; nest densities, nest success, and ducklings produced were higher in all idle vegetation than in all grazed and/or mowed vegetation.

2. MLH-15: Carp Control Study - Control Methods and Their Application to Malheur National Wildlife Refuge

The 1978 Narrative summarized the results of this study through 1977, and presented a progress report on the results of the carp telemetry work that was completed in 1978. The following summary of our last carp control program in 1977 will be incorporated in the final report of this study, which was being prepared at the close of the period.

SUMMARY OF 1977 CARP CONTROL PROGRAM

a. Reconnaissance and Preparation

As a result of an extremely dry winter and predictions of a severe drought during 1977, a decision was made in March 1977 to plan for a rotenone treatment of Malheur Lake during September.

From the experience of past control programs on the lake it was known that total eradication of the carp was impossible. In fact, it was apparent that no more than five years would pass before the carp would be back to their pretreatment level. Therefore, although carp were scattered throughout the Blitzen and Silvies River systems, it was decided to treat only the lower two miles of each tributary. This would leave carp to reinfest the lake; however, it was thought that more fish would survive the lake treatment than were in both of the tributaries combined.

It was decided that, as in past treatments, a liquid emulsifiable rotenone compound would be used. A site was chosen in the lake for field testing the rotenone compound Pro-noxfish, manufactured by the S. B. Penick Co., to determine the proper concentration to be used. Results of the testing revealed that a concentration of about 3ppm was needed to achieve a near 100 percent kill of carp in Malheur Lake.

Next, fish control experts with the Oregon Department of Fish and Wildlife were consulted as to the proper method of aerial application. They suggest that the toxicant be applied as close to the surface as possible to penetrate the thick emergents covering the lake surface, and to reduce evaporation and drift of the chemical. Local agricultural spray pilots were then questioned as to the lowest altitude they could safely apply the toxicant, and they agreed that the application could be made at an elevation of 6-12 feet.

The lake level was continually monitored throughout the summer from USGS Stations, and by the end of July the lake had receded to 20,000 surface acres. At this point the lake level for September was predicted to be between 10,000 and 15,000 surface acres or 8,000 to 13,000 acre feet.

In August bid invitations were issued to the major manufacturers of rotenone and also to agricultural spraying firms. S. B. Penick and Co. received the contract on rotenone for 12,000 gallons of their liquid emulsifiable product, Pro-noxfish. Gar Aviation and the Burns Flying Service received the contract for the aerial application of the toxicant.

b. Plan of Operation and Application of Fish Toxicant

A meeting was scheduled with the spraying firms during the first week of September to discuss the method of application and to set a target date. It was agreed that the lake should be sprayed in a northeast-southwest direction and that the base of operations would be located on the dry lake bed east of Pelican Island. September 22 was selected as the target dates for the lake treatment.

c. Treatment and Results Observed in 1977

(1) Blitzen River - On the morning of September 18 a drip station was established at Springer Dam, two miles up from the Blitzen River-Malheur Lake confluence. The concentration used was 1.5ppm. From observations of dead and dying fish it was determined that the toxicant began entering the lake the afternoon of September 19. The toxicant was introduced continuously at this station until September 29. It was estimated that at least 50,000 carp were killed in the river.

(2) Silvies River - Treatment of the lower Silvies was not necessary as by August the lower twenty miles of the river had dried completely.

(3) Malheur Lake - The lake treatment started at 10:00 a.m. on the morning of September 22 and was completed the following afternoon. It took six Pawnee Brave aircraft a total of eleven hours to complete the spraying. Four of the spray planes carried 120 gallons per trip, and two carried 200 gallons per trip. The planes were filled from tank trucks at the landing strip on the dry lake bed. Each plane treated a strip of water 50 feet wide. The planes worked in pairs, two starting at the west end, two in the middle of the lake, and two beginning at the east end. The toxicant was applied undiluted at an approximate concentration of 2.8ppm, or about one gallon per acre foot. Although testing indicated that a concentration of about 3ppm was needed to achieve a near 100 percent kill in Malheur, due to funding limitations only enough rotenone could be purchased for application at 2.8ppm.

The USGS staff gauge at the mouth of the Blitzen River indicated that the lake surface elevation on the day of treatment was 4,090.7. This indicated a volume of 13,000 acre feet.

The day prior to the lake treatment four monitoring stations were established in the lake. Each station consisted of a live cage containing carp and a 3'x3' piece of oil sensitive paper which was attached to a stake several inches above water level (oil is the carrier in the rotenone product - Pro-noxfish). The stations were selected in open as well as dense bulrush covered areas.

The day following treatment the stations were checked and all carp in the live cages were dead. Additionally, even in the dense bulrush areas the oil sensitive paper showed a good sprinkling of dots indicating that the majority of the rotenone penetrated the vegetation. Next, water samples were collected throughout the lake and analyzed the same day for rotenone concentration. The analysis showed a lake-wide concentration of between 1.5 and 2.0ppm indicating that a portion of the rotenone had been absorbed by the bulrush.

Very few dead carp were observed in the lake during the two days of application, although many fish were seen swimming near the surface in distress. The day following the completion of the treatment dead and dying carp were observed throughout the lake, with many more fish surfacing during the next several days.

On September 28 an aerial reconnaissance disclosed that the area east of Cole Island Dike (900 acres) needed to be retreated as there were only several thousand dead carp visible. More rotenone was ordered and the area was retreated at a concentration of 4.0ppm on October 23.

One month after the treatment experimental gill nets were set in the lake and the carp catch was compared with the previous autumn's netting data. The carp catch was down 82 percent from the previous year. Other fish species found in the lake were decreased by 98 percent.

d. Response to Carp Control - 1978 and 1979

Prior to carp control in 1977, Malheur Lake contained only 2,000 acres of sago pondweed (Potamogeton pectinatus). That was the smallest acreage recorded since 1968 which was just before the most recent previous carp control program. The aquatic plant survey conducted in August 1978 revealed that 22,220 acres of sago pondweed were present in Malheur Lake, an increase of 1,111 percent over 1977. Both density and acreage of sago pondweed decreased in 1979, but there were

still over 17,000 surface acres of sago pondweed in Malheur Lake. Malheur Lake, which contained less than 13,000 surface acres at the time of carp control in 1977 peaked at about 60,000 acres in 1978 and reached record high of about 70,000 surface acres in 1979.

Waterfowl response to carp control was impressive. In 1977 total waterfowl use-days on Malheur NWR were 7,400,640. That was the first year since 1961 that total use-days fell below 10 million. In 1977, Canvasback use-days totaled 108,870, Redhead use-days were 257,820, and Whistling Swan use-days were 190,440. In 1978, the first year following carp control, total waterfowl use days on the refuge more than doubled to 16,445,078. In 1979, use-days increased further to 17,713,262 even though sago pondweed acreage decreased in density and acreage. Much of the increase in total use-days resulted from a striking increase in Canvasback and Redhead use. Canvasback use-days jumped over 400 percent to 481,350 in 1978 and another 330 percent to 1,594,848 in 1979. Redhead response was equally strong, jumping over 300 percent to 824,280 in 1978 and another 128 percent to 1,051,044 in 1979.

Whistling Swan use-days declined 29 percent in 1978 but in 1979 rose to 350,322 which was an increase of 184 percent over 1977.

It is obvious that a combination of several factors (including the oxidation of sediments of much of the bottom of Malheur Lake during the drought and carp control followed by two excellent water years) resulted in a remarkable increase in waterfowl use in Malheur Lake. In 1979, increased carp activity was observed in Malheur Lake. It is apparent that carp control is a temporary measure that must be repeated periodically to maintain enough sago pondweed to meet the needs of migrating waterfowl that use Malheur Lake.

3. MLH-17: Comparison of Effects of Burning, Haying, Grazing and None-use on Wet Meadow Vegetation and Small Mammals

   a. Objectives

      (1) To compare burning and grazing as techniques for coming out of non-use.

      (2) To evaluate the impacts of burning and grazing on biomass production and species composition.

      (3) To compare haying, burning, grazing, and non-use as they effect vertical foliage projection, ground cover, and production.

      (4) To evaluate the impacts of burning and grazing on small mammal densities.

This is the second phase of MLH-16 initiated by Squaw Butte Range Experiment Station. A plot was burned in November 1978 in an area that had been on non-use for three years. The burn plot and an adjacent unburned control plot were fenced to exclude cattle. Cattle were turned into the remainder of the field in November. Part of the field had been hayed the previous three years and part had been in non-use.

One growing season after the burning and grazing treatments were applied, measurements indicated that the burn plots produced the most new growth at 8106 kg/ha. The hayed plot and grazed plot were about equal in production; 7296 and 7096 kg/ha, respectively. The non-use plot produced 5436 kg/ha which was slightly above the amount produced the previous two years.

Using a modified Robel pole technique to estimate structural attributes of the manipulated vegetation indicated that grazing produced the most favorable vegetative response. The 100 percent obstruction height for the grazed plot was 8.2 dm while this height for the burn, hay, and non-use plots was 6.5, 7.0, and 6.5 dm, respectively.

Small mammal trapping grids were established on four plots receiving different treatments. A mark and recapture technique was used to census the small mammal populations on these plots. Treatments included burning, non-use, grazing, and mowing and grazing. Montane voles (Microtus montanus), deer mice (Peromyscus maniculatus), and vagrant shrews (Sorex vagrans) were trapped on the plots.

In October 1978 the traps on the burn plot were run following burning and on the mowed plot following mowing. In March 1978 traps were run before green-up. The mowed-and-grazed and grazed-only plots were grazed in the winter of 1978-79 and again in the winter of 1979-80.

Preliminary results demonstrate a strong positive response of all three small species to burning one growing season after the burn, and a strong negative response to mowing and grazing and grazing without mowing. Voles, deer mice, and shrews were common on the non-use control plot, but not as common as on the burn plot one growing season after the fire.

B. Cooperative Programs

The three cooperative programs conducted at Malheur this year included YACC, YCC and the use of a College Work-Study student.

Our 1979 YCC program consisted of one 6-week non-residential camp with 24 enrollees. Bud Pack, an industrial arts teacher from Burns, Oregon, served as director of the camp which ran from July 9 to August 19. Transportation was provided through a combination of GSA and YACC

vehicles since YACC was not able to furnish all our vehicle needs as originally planned. Most of the YCC projects are discussed in the construction and maintenance section.

1979 Malheur YCC Photo: Unknown

YCC pouring concrete sidewalks at headquarters.

Photo: Ditto

The YACC program faultered from inadequate funding in FY 79. By July, the Work Leader Judy Weider, had no enrollees left and was unable to hire any. To our disappointment, Judy resigned on October 31, 1979. She did a tremendous job in getting the YACC program off the ground and completed many worthwhile projects during her one-and-a-half year tenure.

Some of our enrollee ceilings were returned in October when two people were hired to work in the P-Ranch area. On December 3rd an additional five enrollees came on board and have done a fantastic job working with minimum supervision, without a Work Leader. Even with its financial problems, YACC paid real dividends again this year by accomplishing tasks which the refuge staff simply did not have the time for.

Through a cooperative program with Eastern Oregon State College, we were able to hire a Work Study student for the summer period. During his ten week appointment, Manuel Pekaicheng, a student from Micronesia, worked at a variety of projects, including the visitor contact station duty on weekends, grounds maintenance and assisting with biological projects. The Work Study student program helped reduce our summer work load and we paid only 22.5 percent of the $4.25 hourly wage.

C. Items of Interest

Staff training included the follow:

Alfstad	Simplified Procurement Time Management
Cornely	Workshop/Predator Management for Waterfowl Production
Ditto	Law Enforcement Refresher Training NEPA Workshop
Ehlers	I&R Workshops "Cynosure II" and "AIN"
Mazzoni	Water Law Short Course Citizen Participation by Objectives
Miller	Introduction to Supervision
Thompson	Introduction to Supervision
Yriarte	Introduction to Supervision

Refuge Manager Mazzoni served on a National I&R evaluation team that evaluated the I&R program at the Craigbrook NFH, Bangor, Maine. He also participated as a member of the refuge master planning task force that is developing a standardized national master planning process and procedures for the refuge system.

Mazzoni, Ditto, Cornely, and Thompson attended the combined Pacific Northwest Section of the Wildlife Society and Goose Symposium meetings in February.

Bradley D. Ehlers participated in a duck banding assignment in Canada from July 31st to September 7th.

Ehlers banding ducks in Alberta. Photo: Gladwin Pocatello Complex

Steve Thompson presented a paper on the history, status, and reproduction of Golden Eagles in the Harney Basin at the Annual Raptor Research Foundation meeting in Davis, California in November. John Cornely presented a paper on aversive conditioning of coyotes at the Second Conference on Scientific Research on National Parks, held in San Francisco in November. He also attended the annual Mammologists Society meeting at Oregon State University in Corvallis, in June.

Norman J. Warneke and Charles L. Yriarte each received Special Achievement Awards in the amount of $250.00 in recognition of their outstanding performance and contribution to the refuge program.

Ruth Warneke was promoted from Clerk-Typist GS-4 to Secretary GS-5 effective November 18th.

John Cornely presented a talk to the Lakeview Chapter of Society for Range Management concerning the use of grazing as a waterfowl habitat management tool (January).

Mazzoni explains grazing program during interagency tour.

Photo: Sheeter
BLM

The staff conducted an interagency refuge tour in May to discuss land management practices with biologists and range conservationists from the Oregon Department of Fish & Wildlife, the Burns BLM District and the Ochoco and Malheur National Forests. Results of habitat management practices were demonstrated. An interchange of ideas on management techniques has helped us maintain an excellent rapport with these agencies.

D. Safety

Monthly safety meetings were held, except for the months of April, September and December. Flood conditions, work projects, and staff leave during the holidays limited personnel available to hold meetings during those three months.

Quarterly safety inspections were performed by staff members and discussed during the monthly meetings with corrective action taken. Safety films were usually shown during the meetings and various programs discussed. The YACC Work Leader and enrollees also attended the meetings.

Yriarte (left) receiving Special Achievement Award; presented by Ditto.

Photo: Ehlers

Warneke (left) with his Special Achievement Award; presented by Mazzoni.

Photo: Ditto

You all look great! Ruth

Go get 'em Hello for my family / Tell the family hello. F.J.

Hi Joe, Larry Margaret

who dat! That's Norma Perry P

Malheur NWR Staff Photo: Ditto

PERSONNEL

Front Row (Left - Right) → notice the pay difference pfg?

William R. Aulbach, WG-9, PFT	Maintenance Mechanic
Norman J. Warneke, WL-9, PFT.	Work Leader
Ruth Warneke, GS-5, PFT	Secretary
Charles L. Yriarte, WG-9, PFT	Maintenance Mechanic
Bradley D. Ehlers, GS-9, PFT.	Assistant Refuge Manager

Hi Brad Larry Waraczynski Neenah, Wi.

Hi Brad Paul Waggoner

Back Row (Left - Right) Enjoyed your photos

Looks good, Larry — Ken Beals (Arawhata)

Joseph P. Mazzoni, GS-13, PFT	Refuge Manager
Marvin L. Jess, WG-10, PFT	Dragline Operator
John E. Cornely, GS-11, PFT	Wildlife Biologist
Larry R. Ditto, GS-11, PFT	Assistant Refuge Manager
Steven P. Thompson, GS-9, PFT	Assistant Refuge Manager
Clyde R. Miller, WG-9, CS	Maintenance Mechanic

Hi Larry Ed

Not Pictured

Ernest A. Alfstad, GS-7, PFT	Administrative Officer

?? GS-15 PFT . . . . . Dog. PROJECT LEADER

Safety program related accomplishments not already discussed in earlier sections included: scheduled testing and recharging of fire extinguishers; disposal of an accumulation of hazardous pesticides that can no longer be used on refuge lands; and installation of a variety of safety signs in hazardous areas.

Ten personnel attended a Defensive Driver Training course in March.

No lost-time injuries occurred during the year. One minor injury was reported. No work injuries were reported for YACC during the year. One YCC vehicle accident occurred when one of the staff personnel drove over a large rock concealed in the sagebrush.

E. Credits

Section I	A, B, C, D	- Joseph P. Mazzoni
Section II	A, B, C	- Larry R. Ditto
Section III	A	- Larry Ditto
	B	- Joseph P. Mazzoni
	C, E	- John E. Cornely
	F	- Joseph P. Mazzoni
Section IV	A, B, C	- John E. Cornely
Section V	A, B, C	- Bradley D. Ehlers
Section VI	A	- John E. Cornely
	B	- Larry R. Ditto
	C, D	- Ernest A. Alfstad
	E	- Steven P. Thompson
Typing		- Ruth Warneke

All personnel have contributed to the information necessary to compile this report.

This narrative was edited by Joseph P. Mazzoni.

what's the cost to keep up the flower gardens & volunteers the energy?

Beautiful!

A True Oasis!

IMPRESSIVE!

Beautiful, and a great reflection on the staff's attitude! DRP

Very nice!

Pretty!

What does this do for wildlife?

Well manicured grounds at headquarters received frequent compliments from refuge visitors.

As well it should! yRF

Photo: Ditto

WOW! g.c.

Many hours of loving work represented here! Great!!

You're lucky you have a large staff to tend to your lawn & flower beds.

Looks like somebodies residence to me! ☆

Ex. Mgr's House. DeFelice

REFUGE NARRATIVE REVIEW RECORD

DATE	INITIALS	COMMENTS	COPY TO W.O.
KO	4/29		
5/2/80	B	Excellent – as usual. Pg 30 duplicated?	
June 30-80	[illegible]	Good summary of biological data	
7/8	EMW	Very nicely prepared and documented Narrative. You maintain a high community profile (Staff also) and excellent maintenance standards. He tries to go first class all the way. I respect his efforts as a Program Coordinator.	
7/8	RAK		
7/10	JJ	Positive support to GCC/GACC.	

IN	OUT	REFUGE	MANAGER	COMMENTS
11/13	11/14/84	Sandhill	Joe Podruzny	MALHEUR - dy staff Held for ASST.
11/16	12/5/84	ARAPAHO	Eugene Eaton	
12/10		Flint Hills	Bill Wilson	
12/19/84	12/19/84	Kirwin	Lee A. Wright	A good "Semi" Bunch.
12/27/84	1/8/85	Yukon Delta NWR		
1/14/85	1/14/85	Arctic NWR	Doug Mutch	
1/14	1/14	Yukon Flats	Lon Swenson	
1-21-85	1-21-85	Kanuti NWR	Evan W. McIntosh	
1-25-85	1-25-85	Koyukuk NWR	Mike Amos	
2/11/85	2/11/85	Nowitna	Jim Fisher	
2-19	2-20	Innoko	Phil Geiger	
2/28	3/7	Selawik	Kent Hall	
5/8/85	5/9/85	TOGIAK	Dave Fisher	
5/14/85	5/17/85	Tetlin	Dave Stearns	
	6/3/85	AK Pen/Becharof	Ron Hood	
6/12/85	6/13/85	Izembek	John Lewis	Lots of water since '29, hope the refuge is recovering from the floods.
6/21/85	6/24/85	Aleutian Is Unit Adak, AK	Fred Zeillemaker	
7/1/85	7/8/85	Kodiak NWR	Jay F. Billington	
7/15/85		ALASKA MARITIME NWR	L. Mutch	
7/24/85	7/26/85	Kenai National Wildlife Refuge	K. J. Allen	
8/2/85	8/8/85	Hawaiian Islands	Jerry F. Leonard	Hello Joe - hope things are doing well in AK!
8/14/85	8/19/85	Umatilla	Bill Hamilton	
8/22/85	8/26	Lower Columbia River Refuge Complex	John H. Kinchelow	
9/16/85		WILLAPA NWR		
9/20/85		Columbian White-tailed Deer	Ed Hagedorn	
9/27/85	10/2/85	Ridgefield	Bruce Wasdon	

IN	OUT	REFUGE	MANAGER	COMMENTS
		Refuge mgmt.		
3/24/84	4/3/84	Asst. SD-NE	Janice Schneider	
4/5	4/11/84	Tewaukon	Dave Potter	A real jewel in the high desert — I sure enjoyed Mallards!
4/13/84	4/13	Valley City WMD	Lloyd Jones	
		Devils Lake WMD	Dave Jones	LARRY SURE DOES SOME FINE PHOTO WORK.
	5/15	Arrowwood	John Foster	
		Kulm		
5/24	6/1	Long Lake NWR	Mike McEnroe	
6/2/84	6/8/84	Audubon NWR	Ken Stupe	
6/10/84	6/14/84	Lake Ilo NWR	Rick Potter	Brad, I enjoyed your visit.
6/15/84	6/15/84	J. Clark Salyer	Fred H. Heye	
6-18-84	6/20/84	Upper Souris	Hanna B Wright	Good job
6.21.84		Des Lacs Nat	D D Pass	
6-29-84	6-29-84	Hostwood NWR	K. Smith	
7/2		Crosby WMD	Blaine Eckhardt	
7/12	7/18/84	MEDICINE LAKE	GENE STROOPS	Kaschke was wrong. Cirr. is taking longer than 5 yrs
7/19/84	7/20/84	CMR-Ft Peck	Fran Mann	
7/23/84	7/24/84	CMR-Jordan	Dave Bennett	
7/27/84	7/30	CMR-Sand Creek	Jim McCollum	
8/2/84		Boudoin	Gene Sipe	
8/7	8/9	CMR-Lewistown	Ralph Frias	
8/13	8/17	Benton Lake	J Lemmon	
8/20	8/21	Bison Range	Jon Malcolm	
9/3		Red Rock Lakes	Bay Rising	
9-10-84	9/20	Nat'l Elk Refuge	Bill Wellet	Good job
	10-2	Bear River MBR	Peter T. Smith	Nice Pic.
10/04/84		Fish Springs	Charlie Darling	
10/12/84		Ouray		
10/29	11/05/84	Browns Park	Jim Creasy DC	Hi George, Dean + Brad

IN	OUT	REFUGE	MANAGER	COMMENTS
7-1	7-18	Delta	Ted Hamm	Beautiful refuge
	8/12	MSC	Bill A. Gabriel	
	9-15	Choctaw	Jerome Carroll	Enjoyed it!
9-21	9-24	Noxubee	Jim Roberts	
9-28	10-19	Wheeler	Thos. Z. Atkeson	
10-20	10-26	Eufaula	Donell Kempke	
10-28	10-29	St Vincent	Martin Perry	
11-2-81	11-4-81	St. Marks	Deborah Nolle	
	11/5/81	Tallahassee	Richard L. Thompson	
11-9	11-10	Chassahowitzka	Ed Collingwood	
11/17	11/20	Big Darby	Del Pierce	
11-24	11-25	Mark Key Dean	Don Kosin	
12/1	12/	Caribbean Islands	Glen Gravino Bernice DeBastos	Good Report
12-8	12-12	Loxahatchee	B. Neely	
12-14	12/20/81	Merritt Island	Stephen L. Nehrs	
12/23/81	12/28/81	Lake Woodruff	Bruce Blohm	Good Job
12/30/81	1/5/82	Okefenokee	John Eadie	Very Fine Area
1/5/82		Savannah Complex	Glen Carowan	Hi Joe & Larry
1/28/82	2/1/82	Piedmont	Ronnie Shell	
2/9/82	2/11/82	Cape Romain	J.R. Harris	
FEB 12 1982	2-17-82	SANTEE NWR SUMMERTON, SC	Paul E. Ferguson	Enjoyed Report - Regards Larry
2/26/82	3/1/82	Carolina Sandhills	Marvin Hayslip	
3/2/82	MAR 8 1982	Pee Dee	Jerry L. Halloman	
3/18/82		Pea Island	Ron Light	
3/29/82	4/14/82	Back Bay	Glen Bond	
4/17/82	4/26/82	Dismal Swamp	M.G. Tansey	
4/30	4/30	Presquile	Harold Olson	
5/3/82	5/19/82	Chincoteague	Jerry Holland	Outstanding Job

IN	OUT	REFUGE	MANAGER	COMMENTS
	3/10/80	Malheur	J. P. Mazzoni	
3/14/80	4/4/80	Klamath Basin		
4/7/80	5/14/80	Sheldon-Hart	Marvin R. Kaschke	Fine job. Off to a good start you'll see in about 5 yrs at this rate
6-2-80	6/18/80	SFB	Roger T. Johnson	Quality shows!
6/25/80	7/3/80	Sacramento NWR	Jack Helvie	Super job!
~~7/24/80~~		Desert NWR	Robert S Fowler	
8/18/80	8/19	Salton Sea NWR	L N Olson	
9-26-80	9/30/80	Kofa NWR	Milton Haglerlie	
		Cibola NWR	W Martin	
10/27/80		HAVASU	Ty Berry	
11/11/80	11/17/80	Cabeza Prieta	Jim Fisher	Nice report - fine photos -
	1-5-81	Bosque	Ron Perry	
1/13/81	1/19/81	Muleshoe	Allen Jones	
1/31/81		Wichita Mts	Earl Kreger	
2/2/81		Sequoyah NWR	John Klein	Got about 25 at one time
2/18/81	2/25	Washita NWR	E V Kell	
	3/9	Cross Timbers NAP	Frank Johns	Nice picture, Larry. Come see us.
3/20/81	3/23/81	Buffalo Lake	Larry Wynn	
3/25	3/30	HAGERMAN	Jim Wilkins	
4/1	4/3	Nella Bend	Cecil O McMullen	
4/6	4-7	BIG LAKE	Marvin L Nichols	
4/13	4-16	Hatchie	J. C. Bryant	
4-17	4-24-81	Wapanocca	Wilfred Riley	
4/27/81	5-14-81	White River	R. R. McMaster	Hello Joe Long time since Denver
5/15/81	5/22	Felsenthal	Acting Monty Gaehring	Good report! Some excellent pics.
5/28	6/1	D'Arbonne	Daniel W Dockter	
6/6	6-18	Catahoula	Stephen L Jaynes	
6/22	6/24	Lacassine	Bob by W. Brown	

IN	OUT	REFUGE	MANAGER	COMMENTS
5/20/82	5/25/82	Blackwater	Joe Delacruz	Good report
5/28	6/10	Mason Neck	Dom Ciccone	Quite a Refuge
6/11	6/11	Eastern Neck	Lou Hinds	
6/14		Prime Hook	Geo. F. O'Shea	
6/16	6/22	Bombay Hook	Don R. Perbuchine	A bouquet for your office landscaping.
6/25	6/28	Brigantine	Al Lewis	
7/1/82	7-6-82	Ninigret NWR	Jim V. Tiller	Hi Joe Still have a top-notch crew there!
7/13/82	7/14/82	WERTHEIM	Roger L. Spaulding	
7/22/82	7/30/82	Great Swamp	J. F. Ellis	Excellent!
8/5/82	8/6/82	Tinicum NE	Dick Nugent	
8/11/82	8/16/82	Erie	William J. McKay	
8/18	8/30	IROQUOIS	Ed Chandler	Our A.L. - Sorry
8/31	9/6	Montezuma	Steve Hecht	Good dob Good report...
9/17	10/21	Missisquoi	T. Mountain	
10/26/82		Moosehorn	Doug Mills	
11/24/82	11/29/82	Rachel Carson	Manny Mills	Good Report.
12/01/82	12/3/82	Parker River NWR	Robert A Zelley	
12/7/82	12/13	Great Meadows		
12/20/82	12/23	Ottawa NWR	Lee Kerzberger	
12/29	1/3/83	Musketatuck	Charles Eckleff	good looken Dog.
1/6/83	1/27/83	Shawangunk NWR	Joe Hardy	
01/21/83	2/04/83	Seney NWR	Don Truckie	
2/7/83	2/11/82	Oxbow NWR	John Seymour	
2-14-83	3/28/83	Necedah NWR	Jim Cox	
3-1-83	3-16-83	Upper Miss	Bob Howard	
3-18-83	3-29-83	Trempealeau NWR	Jim Clapp	
5-16-83	5-28-83	Chautauqua NWR	Tom Fairchild	
6-1-83	6-8-83	Crab Orchard	Wayne Easter	

IN	OUT	REFUGE	MANAGER	COMMENTS
6/9/83	6/15/83	Calhoun	Georgeann Boston	
6/23/83		Mingo NWR		
7/5/83	7/13/83	Clarence Cannon	Greg Wolf	
7-15-		Swan Lake	Jack Tolle	
7-22	7-28-83	Mark Twain NWR		
8-1	8-8-83	Louisa	Wayne Stanley	Hi Wayne!
8/12		Squaw Creek	Darlin Hicks	Howdy Dean - you are on board by now
8/16		Delta NWR		
8/22	8/25	Union Slough	John Lietzau	
8/29	9/1/83	Fergus Falls WMD	Rolla Redfield	
9/6/83	9-7-83	Litchfield WMD	Walter Weaverdyck	
9/22/83	9/26/83	Rice Lake	Diane Hoffman	Hi Deanie, good luck! Looks like a good, full, well-thought out program. Hi to all the Staff!! Enjoyed report. Lots of memories
9/28/83	10/3/83	Morris WMD	Al Radtke	
10/20/83	10/25/83	Big Stone NWR	Bill Heinecke	Hi Brad - you're still bald!
10/26/83	11/16/83	Sherburne NWR	Dan Engel	One of the best
11/18/83	11/25/83	Mn Valley NWR	E Crozier	" " "
12/2/83	12/9/83	Tamarac NWR	Ron Nuemeyer	
12/15/83	12/22/83	Detroit Lake WMD	Howard A. Lipke	
DEC 23 1983	1-4-84	Agassiz NWR	Jack Lorek	
1-9-84	1/17/84	Rainwater Basin WMD	Trout	
1/18/84	1-19-84	FORT NIOBRARA-VALENTINE NWR COMPLEX	Bob Ellis	
1/31/84	2/1/84	Valentine NWR	Dave McDaniel	
2/4/84	2/9/84	Crescent Lake NWR	Ken Smith	
2/13/84	2/21/84	Lacreek NWR	Earl Kopp	
2/23/84	2-27-84	Lake Andes NWR	Tuck Stone	
3/1/84	3-5	Madison WMD	Dave Hall	
3/6/84	3/12/84	Sand Lake NWR	Sandy Goltstein	
3/13	3/22	Waubay NWR	John Koerner	